PATENT CLAIMS

1. A method for the production of a layer of functional molecules on a carrier surface using cell surface layer proteins (S-layer proteins) as a carrier of the functional molecules, wherein a solution containing S-layer proteins in the form of monomers or oligomers is brought into contact with the carrier surface, a layer of S-layer proteins is deposited on the carrier surface, and a two-dimensional crystalline structure is configured in the layer that is formed in this way, characterized in that

to deposit the S-layer proteins, electrochemical conditions are set in the solution in which the S-layer proteins have an electrical net charge and, by setting the electrical potential of the substrate, an electrochemical potential difference is created between the solution and the carrier surface under whose effect the S-layer proteins are added from the solution to the carrier surface.

2. The method as described in Claim 1, characterized in that the deposition of the S-layer proteins and the formation of the crystalline structure occur in a time-separated manner and under different electrochemical conditions of the solution and/or the substrate.

3. The method as described in Claim 2, characterized in that, to change the electrochemical conditions between deposition and crystallization, the electrochemical potential of the carrier surface is changed in relation to the solution.

4 The method as described in Claim 2 or 3, characterized in that, to change the electrochemical conditions between deposition and crystallization, at least one chemical parameter of the solution is varied.

5. The method as described in Claims 2 to 4, characterized in that, to change the electrochemical conditions between deposition and crystallization, at least one electrochemical parameter of the solution is varied.

6. The method as described in one of Claims 1 through 5, characterized in that the potential (Ur) of the solution is measured in a current-free manner by means of a reference electrode (RD).

7. The method as described in one of Claims 1 through 5, characterized in that the electrical net charge of the S-layer proteins is impressed on them potentiostatically.

8. The method as described in one of Claims 1 through 7, characterized in that, in the deposition of the S-layer proteins and/or the formation of the crystalline structures, a conformation change of the proteins occurs, in particular a denaturing or renaturing.

9. The method as described in one of Claims 1 through 8, characterized in that the deposition of the S-layer proteins and/or the formation of the crystalline structure are controlled by a time-varied potential curve.

10. The method as described in one of Claims 1 through 9, characterized in that the deposition of the S-layer proteins on the substrate is carried out in a first solution and the formation of the crystalline structure is carried out in a second solution.

11. The method as described in Claim 10, characterized in that a net charge is electrostatically or electrophoretically impressed on the substrate before dipping into the first solution and is maintained during the run through the solutions.

12. The method as described in Claims 10 or 11, characterized in that a net charge is electrochemically impressed on the substrate in the first solution and is kept when the solutions are changed.

13. The method as described in one of Claims 10 to 12, characterized in that the change of solutions happens by transport of the carrier surface from a first solution bath (for the deposition) to a second (for the crystallization).

14. The method as described in one of Claims 1 through 13, characterized in that functional

molecules are bonded to S-layer proteins even before the deposition of the S-layer proteins, and thereupon the functional molecules are deposited on the substrate simultaneously with the deposition of the S-layer proteins.

15. The method as described in Claim 14, characterized in that the functional molecules are bonded to one side of the S-layer proteins and for the deposition electrochemical conditions are selected under which the S-layer proteins have a resulting dipolar moment, wherein, because of the orientation of the dipolar moment close to the carrier surface in the electrical field that exists as a result of the potential difference, said side of the S-layer proteins faces away from the carrier surface.

16. The method as described in one of Claims 1 through 15, characterized in that, after the formation of the crystalline structure in the S-layer stratum, functional molecules are deposited on the substrate at positions defined by the crystalline structure.

17. The method as described in one of Claims 1 through 16, characterized in that, after the formation of the crystalline structure in the S-layer stratum, electrochemical nanoparticles are deposited on the substrate at positions defined by the crystalline structure.